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Verification

I,

Dr. Monica Koch, of Canadian and German nationalities,

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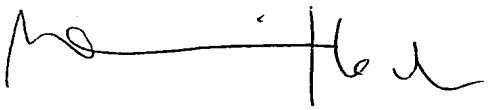
do hereby certify:

THAT I am a Technical Translator of documents including Patent Specifications,

THAT I have good knowledge of both the German and English Languages;

AND THAT, to the best of my knowledge and belief, the attached document is a true and correct translation of the Specification No. 103 05 614.9 filed by Giesecke & Devrient GmbH with their application for Patent in Germany on the 11 February 2003 for "Security paper and method for producing it" and the certificate issued by the President of the German Patent and Trademark Office.

Signed by Dr. Monica Koch on 25 October 2005



(Dr. Monica Koch)

TRANSLATION

FEDERAL REPUBLIC OF GERMANY

Certificate of priority on the filing of a patent application

| | |
|---|---|
| Reference: | 103 05 614.9 |
| Filing date: | 11 February 2003 |
| Applicant/Owner: | Giesecke & Devrient GmbH,<br>Munich/DE |
| Title: | Security paper and method for producing it |
| IPC: | D 21 H, B 44 F |

The attached papers are a correct and exact copy of the original documents of this patent application.

Munich, 9 January 2004

German Patent and Trademark Office

The President

By order

(signed)

# Security paper and method for producing it

[0001] This invention relates to a security paper for producing documents of value, such as bank notes, passports, identification documents or the like, having a plane substrate provided at least partly with a dirt-repellent protective layer for prolonging the life and fitness for circulation. The invention further relates to a document of value having such a security paper and to a method for producing such a security paper.

[0002] Security prints, such as bank notes, shares, bonds, certificates and vouchers, checks, high-quality admission tickets, as well as other papers in danger of being forged, such as passports or other identification documents, are often provided with elaborate printed images to increase their forgery-proofness. Technically sophisticated printing processes that are not accessible to everyone, such as intaglio printing, are used here at least for some of the picture elements.

[0003] Additionally, security prints are frequently equipped with so-called security elements which are difficult to imitate and permit even a layman to check the authenticity of the print or document. Such security elements can be for example windowed security threads, which are visible in certain areas on the surface of the paper of value, applied foils having a transparent or metalized embossed hologram, blind embossings, so-called "latent images" produced by printing technology or by printing and embossing technology which render different information from different viewing angles, prints containing optically variable pigments and producing different color effects depending on the viewing angle, or prints of metallic effect ink which show metallic luster for example in a gold, silver or bronze tone.

[0004] An important component of documents of value, such as bank notes, is their plane substrate which preferably consists mainly of cotton paper and whose typical haptics is also influenced by the one-sided or two-sided calendering during steel engraving. The haptic character of a bank note is expressed mainly by its bulk and bending resistance; it also has a characteristic sound when deformed and creased.

[0005] It is known to provide papers of value with a dirt-repellent protective layer to prolong the life and fitness for circulation. For example, it is proposed in the print

EP 0256 170 B2 to provide printed bank notes with a protective layer which consists for a major part of cellulose ester or cellulose ether and for a minor part of micronized wax and is applied to the notes all over. The micronized wax is dispersed by kneading or mixing with oil, an ink binder or a mixture thereof. Sheets freshly printed with the protective layer can be easily stacked, without black ink from one sheet being transferred to the sheet therebelow.

**[0006]** The print WO 00/00697 discloses a security paper for bank notes having a dirt-repellent coating, which despite the coating remains largely unchanged in its typical properties, such as printability, sound and color, compared to an uncoated paper. The bank note paper, which has a large surface or high surface roughness due to its porosity, has applied thereto a coating composition containing only a binder and no fillers. The composition is applied in a layer thickness so as to produce a smooth surface and thus few possibilities for dirt accumulation, on the one hand, and so that the coating is sufficiently thin not to impair the other abovementioned properties of the paper, on the other hand.

**[0007]** Known protective layers have in common that the wearing protection is not especially high. Conventional protective layers consisting of water-based lacquers usually never quite fulfill a high-level requirement profile. For example, very good dirt repellence and adhesive quality detract from resistance to penetration of liquid (e.g. in the ink penetration test), and vice versa. Water-based lacquers therefore currently meet the high requirements for a protective layer in paper-of-value and in particular banknote printing only if a second component in the form of a crosslinking agent is added. Since such crosslinking agents are highly reactive themselves, operating staff must be sensitized to risks and corresponding precautions taken.

**[0008]** The invention is therefore based on the problem of specifying a security paper and method for producing it that avoids the disadvantages of the prior art. In particular, the security paper should have a longer life due to good dirt repellence and high resistance to penetration of liquid (e.g. in the ink penetration test).

**[0009]** This problem is solved by the security paper having the features of the main claim. A document of value and a method for producing a security paper are the sub-

ject matter of the independent claims. Advantageous developments of the invention are the subject matter of the subclaims.

[0010] According to the invention, the protective layer comprises at least two lacquer layers, a first lower lacquer layer being formed by a physically drying lacquer layer applied to the substrate, which produces contact with the substrate therebelow and closes its pores, and a second upper lacquer layer being formed by a radiation-curing lacquer layer, which protects the substrate from physical and chemical influences and guarantees good protection from penetration of liquids and ink penetration.

[0011] The invention is based on the finding that the advantageous properties of radiation-curing lacquers can be exploited for security papers if the depressions, irregularities and pores of the substrates are previously closed by a physically drying lacquer layer. Radiation-curing and in particular UV-drying lacquers have the disadvantage that residual monomers and free photoinitiators are normally left behind as very reactive components in the depressions and pores of the substrate after radiation curing in dependence on the substrate quality, the radiant power, the initiator system and the monomer system (UV: ultraviolet).

[0012] This problem occurs especially when the UV lacquer penetrates into a paper fiber composite e.g. of a security paper. Complete polymerization of the UV lacquer is then no longer possible. It has now been found that the positive properties of UV lacquering can be fully exploited for security papers if a combination coating comprising at least two lacquer layers is used, a lower lacquer layer producing the contact with the substrate and closing its pores, and a radiation-curing lacquer layer being applied as the upper lacquer layer.

[0013] The plane substrate of the security paper is formed in particular by an unprinted or printed cotton paper. The cotton paper of security documents and documents of value, such as bank notes, has high porosity and surface roughness with microscopic projections and hollow spaces in which residual monomers and photoinitiators of the radiation-curing lacquer layer will be deposited without the inventive use of a lower lacquer layer.

[0014] The lower lacquer layer is advantageously formed by a water-based dispersion lacquer layer. It is expediently applied to the substrate in a layer thickness so as to form a smooth and contiguous layer on the substrate. It is understood that the required amount of coating depends on the lacquer used, the substrate material used and its roughness and pore size and porosity factor, among other things.

[0015] In an advantageous embodiment, the upper lacquer layer of the protective layer is formed by a UV-crosslinking lacquer layer. The extremely high physical and chemical resistance thereof allows a corresponding qualitative increase and adaptation of the requirement profile. The higher physical resistance causes in particular high abrasion resistance and prolonged life of the security paper. Due to the higher chemical resistance, the protective layer in addition constitutes a long-term stable, effective barrier to water vapor and liquids such as ink.

[0016] Additionally, the use of a UV lacquer offers a great number of possibilities for selectively influencing the haptics of a security paper, in particular a bank note. Adjustment of the parameters, brittleness, luster and smoothness, of the uppermost protective layer makes it possible to directly influence in diverse ways the haptic properties of the coated paper, in particular its bending resistance, smoothness and sound. The composition of the UV lacquer layer is advantageously selected particularly with respect to brittleness and surface tension so as to achieve a predetermined haptics of the security paper, in particular a predetermined smoothness, bending resistance and/or sound.

[0017] Not only radically crosslinking UV lacquers can be used for the outer radiation-curing lacquer layer, but also cationically crosslinking lacquer systems.

[0018] In a preferred embodiment, the upper lacquer layer is applied directly to the lower lacquer layer. Alternatively, a further lacquer layer of water-based dispersion lacquer can be provided between the upper and lower lacquer layers.

[0019] The lacquer layers of the protective layer are expediently coordinated with each other in their adhesive properties so as to form a highly resistant bond. In particular, if the upper lacquer layer is applied directly to the lower lacquer layer, the compo-

sition of the lower lacquer layer is selected so as to guarantee optimal adhesion of the subsequently applied radiation-curing lacquer. In an advantageous embodiment, the wettability of the lower lacquer layer is optimized by reducing the glass transition temperature of the lacquer system. This causes both higher adhesion and improved adhesion promotion.

[0020] According to further expedient embodiments, the upper lacquer layer or lower lacquer layer is transparent and colorless. In particular if a printed substrate is to remain readily visible, both lacquer layers can also advantageously be of transparent and colorless design. The protective effect and adjustability of the haptics of the security paper are fully maintained. It is also possible, however, to color at least one of the lacquer layers. The document of value can thereby be provided advantageously with a slight color tone without different substrate materials having to be held in stock.

[0021] According to another advantageous embodiment, at least the upper lacquer layer has an antibacterial fungicidal finish.

[0022] It has further proved advantageous if the lower lacquer layer is present on the substrate in a coating weight of 1 to 6 grams per square meter, preferably 2 to 4 grams per square meter. This corresponds for the preferred range to an amount of about 5 to 10 grams per square meter in an undried, wet state (e.g. aqueous dispersion lacquer with 40% solids content). In any case the layer thicknesses must suffice to close the irregular depressions and pores of the plane substrate. It suffices for the upper lacquer layer to be present on the substrate with a somewhat lower coating weight of 0.5 to 3 grams per square meter, preferably 1 to 2 grams per square meter. This corresponds for the preferred range in the uncrosslinked state to an amount of about 1 to 2 grams per square meter since UV systems are so-called "100% systems" (100% solids content). In the case of surfaces already smoothed and/or compacted by preceding intaglio printing the values tend to be in the lower range, in the case of raw paper or the backs of intaglio printed pages in the upper range.

[0023] According to an expedient development, the substrate is printed with characters or patterns and the protective layer is applied to the printed substrate. This also protects the print. The protective layer can also contain gaps, for example in the form

of characters or patterns, in which optically variable elements or other security elements are provided or will be provided at a later time.

[0024] According to a further preferred embodiment, the protective layer is applied to the substrate all over. It can likewise be expedient, for example in a bank note, if the plane substrate of the security paper is provided with the dirt-repellent protective layer on its two main faces.

[0025] The invention also comprises a document of value, such as a bank note, voucher, certificate, passport, identification document or the like, having a security paper of the described kind.

[0026] For producing a security paper of the described kind, a plane substrate is provided in step a) and a dirt-repellent protective layer applied to the substrate in step b). The protective layer is applied by first applying a physically drying lacquer layer to the substrate as the lower layer of the protective layer in step $b_1$) to produce contact with the substrate therebelow and close its pores, and applying a radiation-curing lacquer layer as the upper layer of the protective layer in step $b_2$) to protect the substrate from physical and chemical influences.

[0027] If "wet-on-wet" application of the two lacquer layers is impossible, the lower lacquer layer is dried before the upper, radiation-curing lacquer layer is applied. Drying can be effected simply during a sufficiently long waiting period, for example during transport of a sheet over a sufficiently long transport path. In the interests of fast lacquering it is expedient from production-related and economical points of view to accelerate the physical drying by additional measures. This is preferably done using dryers having a hot-air blower and/or an infrared emitter.

[0028] The invention offers especially great advantages if the plane substrate provided is a printed or unprinted cotton paper.

[0029] According to a preferred embodiment, a printed image is printed on the substrate before the protective layer is applied. Alternatively or additionally, a printed image can be printed on the lower lacquer layer after the lower lacquer layer is applied to

the substrate. The upper lacquer layer is then applied to the lower lacquer layer and to the printed image, which is typically not all over.

[0030] The lower, upper, or both lacquer layers are advantageously applied by a flexographic process. The lacquer layers are expediently applied in an amount of coating of 1 to 8 grams per square meter. In another advantageous embodiment, the lower, upper, or both lacquer layers are applied by a screen printing process. In this case the lacquer layers are expediently applied in an amount of coating of 5 to 15 grams per square meter. According to yet another variant of the invention, it is provided that the lower and/or upper lacquer layer is applied by offset, dry offset or indirect letterpress.

[0031] According to an especially preferred embodiment, the plane substrate provided in step a) is a paper-of-value sheet comprising a plurality of single copies for which steps b), $b_1$) and $b_2$) are performed simultaneously. The lower and upper lacquer layers are applied to the substrate especially advantageously in a sheet-fed lacquering machine inline, i.e. in one run.

[0032] The apparatus for carrying out the described method preferably comprises a first lacquer module for applying the lower, physically drying lacquer layer to the substrate, an intermediate dryer for drying the lower lacquer layer, a second lacquer module for applying the upper, radiation-curing lacquer layer, and a final dryer for curing and drying the upper lacquer layer.

[0033] To guarantee constant layer thicknesses, the first and/or second lacquer module is formed by a flexographic printing unit with a chambered doctor blade, anilox roller and printing form cylinder. The anilox roller advantageously has small cells whose volume and/or density determines the lacquer application rate. The chambered doctor blade lies against the anilox roller, fills the cells and simultaneously wipes off surplus lacquer. The anilox roller transfers the lacquer to the printing form cylinder, which is preferably formed by a rubber blanket. The rubber blanket finally transfers the lacquer to the plane substrate, in particular a paper sheet or paper web.

[0034] Further, a lacquer preparation device is preferably provided for adjusting the viscosity of the lacquer and the crosslinker concentration. For the radiation-curing lac-

quer, the lacquer preparation device expediently has a tempering device for adjusting the viscosity and flow behavior of the lacquer. Since there are thus only two influencing variables for the lacquer application rate, namely cell volume and viscosity of the lacquer, such a flexographic printing unit with a chambered doctor blade can be used to realize a lacquering method permitting a uniform, homogeneous and complete lacquer film to be applied to the whole sheet reproducibly and over a very long time period.

[0035] The intermediate dryer is advantageously a controllable IR hot air combination dryer (IR: infrared). It is likewise expedient if two dryer modules are used in the intermediate dryer so that sufficient drying is ensured even at high speed. The final dryer preferably has power-controlled UV drying modules that are coordinated with the wavelength required for curing the upper lacquer layer and the layer thickness thereof.

[0036] Further embodiments and advantages of the invention will be explained in the following with reference to the figures. For clarity's sake the figures do without a true-to-scale and true-to-proportion representation.

[0037] Fig. 1 shows a detail of a cross section through a bank note having a two-layer protective layer according to an embodiment of the invention,

[0038] Fig. 2 shows the layer structure of the bank note of Fig. 1 in a schematic representation,

[0039] Figs. 3 and 4 show the layer structures of further designs of bank notes according to embodiments of the invention, and

[0040] Fig. 5 shows a schematic representation of a sheet-fed lacquering plant for working the invention.

[0041] Figures 1 and 2 show in cross section the structure of bank note 10 having two-layer protective layer 14 according to an embodiment of the invention. Protective layer 14 applied to paper fiber composite 12 of the cotton paper contains lower lacquer

layer 16 comprising water-based dispersion lacquer, and upper lacquer layer 18 applied thereto and comprising UV-curing lacquer.

**[0042]** Lower lacquer layer 16 produces the necessary contact with paper fiber composite 12 and simultaneously closes its capillaries. Lacquer layer 16 is applied in an amount of coating so as to form a smooth and complete surface that guarantees optimal adhesion of the subsequently applied UV lacquer.

**[0043]** The composition of UV lacquer 18 is selected so as to obtain the desired haptic and dirt-repellent properties of the bank note. In particular, the brittleness of the UV lacquer is adjusted so to yield a desired haptics and sound of the bank note. The dirt-repellent properties of the bank note are determined substantially by the choice of surface tension of the UV lacquer. The high physical and chemical resistance of the UV lacquer gives bank note 10 high abrasion resistance and high resistance to penetration of water vapor and liquids. The variability existing in the choice of the material parameters of the UV lacquer also makes it possible to realize novel properties in terms of haptics and sound of the bank notes that were hitherto hardly attainable in security printing.

**[0044]** In the embodiment of Figures 1 and 2, water-based dispersion lacquer 14 is applied to cotton paper 12 in a coating weight of 3 grams per square meter, UV lacquer 18 in a coating weight of 1.5 grams per square meter. In this embodiment, water-based dispersion lacquer 14 has a styrene-acrylic polymer and UV lacquer 18 an acrylate system.

**[0045]** While the representations of Figures 1 and 2 show protective layer 14 on an unprinted paper, it is understood that substrate 12 can also be already printed. This is shown schematically in Fig. 3. There, printed image 20 comprising characters or patterns is printed on cotton paper 12 of bank note 10, and protective layer 14 is applied to printed image 20 and substrate 12. Alternatively or additionally, printed image 22 can be disposed between lower lacquer layer 14 and upper UV lacquer layer 16, as shown in the representation of Fig. 4.

[0046] Fig. 5 shows sheet-fed lacquering machine 30 for applying an inventive combination coating comprising two lacquer layers. Sheet-fed lacquering machine 30 comprises a lacquer preparation device (not shown), two lacquering units 32 and 36, intermediate dryer 34 and final dryer 38.

[0047] The lacquer preparation device is used for adjusting the viscosity of the lacquer and the crosslinker concentration. A tempering device adjusts the viscosity and flow behavior of the UV lacquer.

[0048] First and second lacquering units 32, 36 are each formed by a modern flexographic printing unit with a chambered doctor blade, anilox roller and printing form cylinder. The anilox roller has tiny cells whose volume determines the lacquer application rate. The chambered doctor blade lies against the anilox roller, fills the cells and simultaneously wipes off surplus lacquer. The anilox roller transfers the lacquer to the printing form cylinder, which is formed by a rubber blanket in the embodiment. The rubber blanket finally transfers the lacquer to the paper-of-value sheet to be coated.

[0049] The protective layer can also be applied to a continuous web. This is preferred in particular for unprinted paper webs.

[0050] IR hot air combination dryer 34 used as the intermediate dryer has two dryer modules to ensure sufficient drying even at high lacquering speed. In final dryer 38 the UV lacquer layer is cured by irradiation with intensive UV light and the protective layer additionally dried with infrared radiation and hot air. The power and wavelength of the drying modules of final dryer 38 are adjusted to the required wavelength of the UV lacquer and to the layer thickness on the paper-of-value sheet.

Claims

1. A security paper for producing documents of value, such as bank notes, passports, identification documents or the like, having a plane substrate (12) provided at least partly with a dirt-repellent protective layer (14) for prolonging the life and fitness for circulation, characterized in that the protective layer (14) comprises at least two lacquer layers (16, 18), a first lower lacquer layer (16) being formed by a physically drying lacquer layer applied to the substrate (12), which produces contact with the substrate (12) therebelow and closes its pores, and a second upper lacquer layer (18) being formed by a radiation-curing lacquer layer, which protects the substrate (12) from physical and chemical influences.

2. A security paper according to claim 1, characterized in that the substrate is formed by an unprinted (12) or printed (12, 20) cotton paper.

3. A security paper according to claim 1 or 2, characterized in that the lower lacquer layer (16) forms a smooth and contiguous layer on the substrate.

4. A security paper according to at least one of claims 1 to 3, characterized in that the lower lacquer layer (16) is formed by a water-based dispersion lacquer layer.

5. A security paper according to at least one of claims 1 to 4, characterized in that the upper lacquer layer (18) is formed by a UV-crosslinked lacquer layer.

6. A security paper according to claim 5, characterized in that the composition of the upper lacquer layer (18) is selected with respect to brittleness and surface tension so as to achieve a predetermined haptics of the security paper, in particular a predetermined smoothness, sound and/or bending resistance.

7. A security paper according to at least one of claims 1 to 6, characterized in that the upper lacquer layer (18) is disposed directly on the lower lacquer layer (16).

8. A security paper according to at least one of claims 1 to 6, characterized in that a further lacquer layer comprising water-based dispersion lacquer is disposed between the upper (18) and lower (16) lacquer layers.

9. A security paper according to at least one of claims 1 to 8, characterized in that the lacquer layers (16, 18) of the protective layer are coordinated with each other in their adhesive properties so as to form a highly resistant bond.

10. A security paper according to at least one of claims 1 to 9, characterized in that the lower lacquer layer (16) has a low glass transition temperature to increase the adhesion and adhesion promotion.

11. A security paper according to at least one of claims 1 to 10, characterized in that the upper (18) and/or lower (16) lacquer layer is transparent and colorless.

12. A security paper according to at least one of claims 1 to 11, characterized in that the upper lacquer layer (18) has an antibacterial fungicidal finish.

13. A security paper according to at least one of claims 1 to 12, characterized in that the lower lacquer layer (16) is present on the substrate (12) in a coating weight of 1 to 6 grams per square meter, preferably 2 to 4 grams per square meter.

14. A security paper according to at least one of claims 1 to 13, characterized in that the upper lacquer layer (18) is present on the substrate (12) in a coating weight of 0.5 to 3 grams per square meter, preferably 1 to 2 grams per square meter.

15. A security paper according to at least one of claims 1 to 14, characterized in that the substrate (12, 20) is printed with characters or patterns (20) and the protective layer (14) is applied to the printed substrate (12, 20).

16. A security paper according to at least one of claims 1 to 15, characterized in that the protective layer (14) contains at least one gap.

17. A security paper according to claim 16, characterized in that a security element is provided in the gap.

18. A security paper according to at least one of claims 1 to 15, characterized in that the protective layer (14) is applied to the substrate (12) all over.

19. A security paper according to at least one of claims 1 to 18, characterized in that the plane substrate (12) is provided with the dirt-repellent protective layer (14) on its two main faces.

20. A document of value, such as bank note, passport, identification document or the like, characterized in that the document of value has a security paper according to at least one of claims 1 to 19.

21. A method for producing a security paper in particular for a document of value, such as bank note, passport, identification document or the like, characterized by the following steps:

a) providing a plane substrate; and

b) applying a dirt-repellent protective layer to the substrate, the protective layer being applied by

$b_1$) applying to the substrate as a lower layer of the protective layer a physically drying lacquer layer to produce contact with the substrate therebelow and close its pores; and

$b_2$) applying as an upper layer of the protective layer a radiation-curing lacquer layer, which protects the substrate from physical and chemical influences;

c) crosslinking and curing the upper layer by irradiation with electromagnetic radiation.

22. A method according to claim 21, characterized in that a printed or unprinted cotton paper is provided as the plane substrate.

23. A method according to claim 21 or 22, characterized in that a water-based dispersion lacquer layer is applied as the lower layer.

24. A method according to at least one of claims 21 to 23, characterized in that the lower lacquer layer is applied in an amount of coating that closes the pores of the substrate and forms a smooth and complete surface on the substrate.

25. A method according to any of claims 21 to 24, characterized in that the lower lacquer layer is applied to the substrate in an amount of 2.5 to 15 grams per square meter, preferably 5 to 10 grams per square meter (wet weight).

26. A method according to any of claims 21 to 25, characterized in that the lower layer is dried before the upper layer is applied.

27. A method according to any of claims 21 to 26, characterized in that a UV-crosslinking lacquer layer is applied as the upper lacquer layer.

28. A method according to at least one of claims 21 to 27, characterized in that the composition of the upper lacquer layer is selected with respect to brittleness and surface tension so as to achieve a predetermined haptics of the security paper, in particular a predetermined smoothness, sound and/or bending resistance.

29. A method according to at least one of claims 21 to 28, characterized in that a printed image is printed on the substrate before the protective layer is applied.

30. A method according to at least one of claims 21 to 28, characterized in that after the lower lacquer layer is applied a printed image is printed on the lower lacquer layer, and the upper lacquer layer is applied to the lower lacquer layer and the printed image.

31. A method according to either of claims 21 and 30, characterized in that the unlacquered or lacquered substrate is printed by intaglio printing.

32. A method according to at least one of claims 21 to 31, characterized in that the lower and/or upper lacquer layer is applied by a flexographic printing process.

33. A method according to claim 32, characterized in that the lacquer layers applied by a flexographic printing process are applied in an amount of coating of altogether 3 to 12 grams per square meter.

34. A method according to at least one of claims 21 to 31, characterized in that the lower and/or upper lacquer layer is applied by a screen printing process.

35. A method according to claim 34, characterized in that the lacquer layers applied by a screen printing process are applied in an amount of coating of altogether 5 to 15 grams per square meter.

36. A method according to at least one of claims 21 to 31, characterized in that the lower and/or upper lacquer layer is applied by offset printing or by indirect letterpress.

37. A method according to at least one of claims 21 to 36, characterized in that the protective layer is applied to the substrate all over.

38. A method according to at least one of claims 21 to 37, characterized in that the plane substrate is provided with the dirt-repellent protective layer on its two main faces.

39. A method according to at least one of claims 21 to 38, characterized in that in step a) the plane substrate provided is a paper-of-value sheet comprising a plurality of single copies for which steps b), $b_1$) and $b_2$) are each performed in the same run.

40. A method according to at least one of claims 21 to 39, characterized in that the lower and upper lacquer layers are applied to the substrate inline in a sheet-fed lacquering machine.

## Abstract

The invention relates to a security paper for producing documents of value, such as bank notes, passports, identification documents or the like, having a plane substrate (12) provided at least partly with a dirt-repellent protective layer (14) for prolonging the life and fitness for circulation. According to the invention, the protective layer (14) comprises at least two lacquer layers (16, 18), a first lower lacquer layer (16) being formed by a physically drying lacquer layer applied to the substrate (12), which produces contact with the substrate (12) therebelow and closes its pores, and a second upper lacquer layer (18) being formed by a radiation-curing lacquer layer, which protects the substrate (12) from physical and chemical influences.


Figure 2


Fig. 1

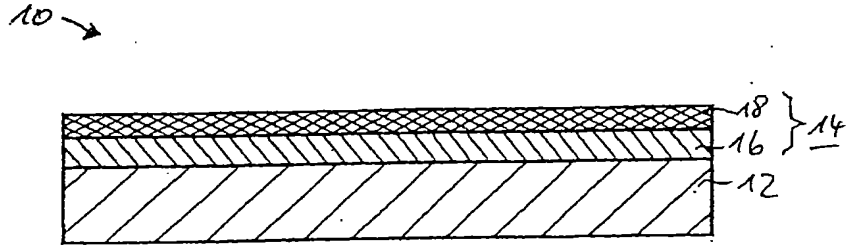



Fig. 2

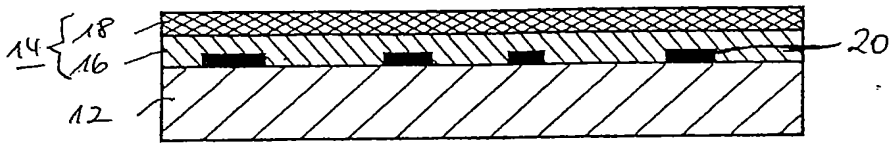



Fig. 3

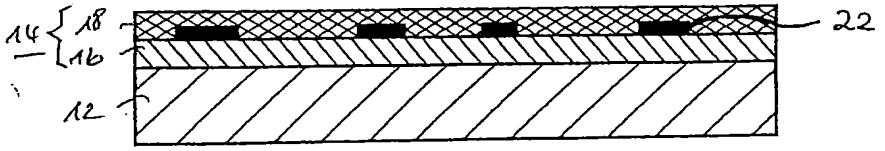



Fig. 4

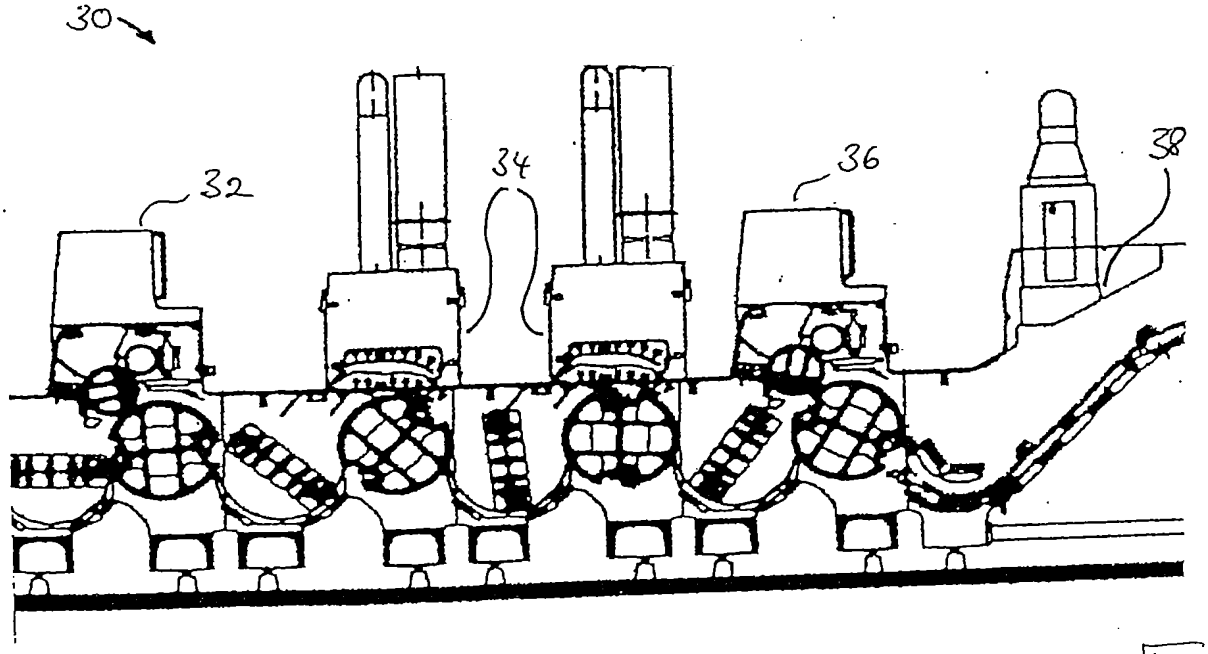



Fig. 5